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XII. — *An Account of some enormous Fossil Bones of an unknown species of the Class* Aves, *lately discovered in New Zealand.* By the Rev. William Colenso.

It was during the summer of 1838 that I accompanied the Rev. W. Williams on a visit to the tribes inhabiting the East Cape district. Whilst at Waiapu (a thickly inhabited locality about twenty miles S.W. from the East Cape), I heard from the natives of a certain monstrous animal, which, while some said it was a bird, and others "a person," all agreed that it was called a *Moa*; that in general appearance it somewhat resembled an immense domestic cock, with the difference, however, of its possessing a "face like a man;" that it dwelt in a cavern in the precipitous side of a mountain; that it lived on air, and was attended or guarded by two immense *Tuataras**, who, Argus-like, kept incessant watch while the *Moa* slept; and that if any one possessing temerity sufficient dared to approach the dwelling of this wonderful creature, he would be infallibly killed by it: an act which it was said to execute much in the same manner as that by which those unhappy criminals are summarily punished in the dominions of the native Indian princes, by the trampling of an elephant, and at which feat this celebrated *Moa* was quite expert.

A mountain, named Wakapunake, at least eighty miles distant in a southerly direction, was spoken of as the residence of this creature; where however only one existed, which one, it was contended by the many, was the sole survivor of the *Moa* race, although they could not assign any possible reason why it should have become all but extinct.

While, however, the existence of the *Moa* was universally believed, (in fact, to dare to doubt of such a being amounted in the native estimation to a very high crime,) no one person could be found who could positively testify to his having had ocular proof of the existence of the animal; for while with every one it was a matter of the profoundest credence, that belief only rested on the bare and unsupported assertion of others. Many of the

* See Note A., Appendix.

natives, however, had from time to time seen very large bones; larger, from their account, than those of an ox; these bones they cut up into small pieces for the purpose of fastening to their fish-hooks as a lure instead of the *Haliotis* shell*, it answering that purpose much better, from its going more equably through the water.

It was almost ludicrous, whilst at the same time it showed the powerful effect which this belief of theirs had over them, to witness their unconcealed fear, almost amounting to horror, on being requested to go to the residence of the *Moa* to procure it, or as a guide thither for that purpose. Unlike, too, what has been very frequently observed in savage nations, this fear seemed not to arise from any degree of superstitious dread, but merely from an abiding conviction of the physical powers of this prodigious animal; as well as from their belief of the moral certainty of such powers being put into immediate action, if they dared to intrude within the precincts of his resort.

As a matter of course, I treated the whole story (as far as related to the present existence of such an animal) as fabulous; looking on it as one more of those many peculiar tales and legends which so abounded in the "olden time," and which every nation under heaven invariably possesses; and I could but think what an excellent companion for the celebrated *roc*† of oriental story and fairy-tale for the nursery it would have made, had it but been known a little earlier.

On our return to the Bay of Islands, several natives from the East Cape district accompanied us. From them I subsequently received pretty nearly the same detail concerning the *Moa*, as I had given me before when in that neighbourhood.

In the following year, 1839, the Rev. W. Williams again visited that district, accompanied by the Rev. R. Taylor. The non-arrival, by the time appointed, of the vessel by which these gentlemen were to return to the Bay of Islands, (and through which cause they were detained a fortnight at the East Cape,) afforded them much more leisure time than I had when there. Mr. Taylor, hearing of this *Moa*, prosecuted his inquiries, and was subsequently rewarded with the discovery of (what appeared to be) a part of a fossil *toe* (or rather claw?) of some gigantic bird of former days.

In the summer of 1841–2, I again visited those parts. At Waiapu I gained the information, that Wakapunake (the mountain where the *Moa* was said to reside) had been visited by some baptized natives, purposely to ascertain the truth of the common belief, and which they declared to be altogether without founda-

* See Note B., Appendix. † See Note C., Appendix.

tion; finding neither cavern, nor lizard-guards, nor *Moa*, nor any signs of such uncommon *lusus naturæ*. But what was of far greater interest to me than this relation of theirs, were some bones which I had the good fortune to procure from them, and which were declared by the natives to be true *Moa* bones. These bones, seven in number, were all imperfect, and comprised five *femora*, one *tibia*, and one which I have not yet been able satisfactorily to determine. The largest *femur*, consisting of the diaphysis only without the processes, measured 8 inches in length, and $4\frac{3}{4}$ inches in girth in the narrowest part. The portion of the *tibia*, which like the *femur* consisted only of the middle part, measured in length 6 inches, and in circumference 4 inches at the narrowest and 5 inches at the widest part. The remaining bone, the largest of all, which was merely a section, measured in length 6 inches, and in circumference $7\frac{1}{4}$ inches at the smallest part. These bones were all (excepting the last-mentioned) of a very dark colour, almost a ferruginous brown, and appeared to have entirely lost their oily matter. They were very stout, especially the *tibia*, and were strongly marked and indented on the outside with muscular impressions. What little remained within of the reticulated cells appeared to be nearly perfect. They were all found by the natives in the Waiapu river, and were collected by them for the purpose of cutting up and attaching to their fish-hooks, in order to fish. The portion of *tibia* which I obtained had been sawn across by the native in whose possession it was, for that purpose. I also obtained several hooks, each having portions of *Moa's* bone attached to it. I could not however ascertain, from the smallness of the slips, whether these had been originally cut out of such bones as those I had just procured, or whether they had not been sawn from bones of a different description and larger size.

Leaving Waiapu, and proceeding by the coast towards the south, I arrived at Poverty Bay, where the Rev. W. Williams resided. This gentleman had had the good fortune to procure a nearly whole *tibia* of an immense bird, without however the entire processes of either end. This bone measured about 18 inches in length, and was proportionably thick. Mr. Williams wishing to send this unique relic to Oxford, I left a pair of *femora* to accompany it, in order, if possible, to obtain from that seat of learning some light on these increasingly interesting remains. At Poverty Bay I made several inquiries after *Moa* bones, but to little purpose, as I could not obtain any.

Quitting Poverty Bay, and still travelling in a southern direction, I soon came within sight of Wakapunake, the mountain celebrated as the residence of the only surviving *Moa*. As natives lived about its base, among whom my route lay, I looked

forward with no small degree of interest to the obtaining at least some *Moa* relics in this locality; in this however I was disappointed. At the close of the second day's travel we arrived at "Te Reinga" (a village situated at the foot of the mountain), where, as opportunity offered, I inquired of the natives relative to the *Moa*. In reply to my reiterated queries, they said that he lived there in the mountain, although they had never seen him, but that the *Moa* bones were very commonly found after floods occasioned by heavy rains, when they would be washed up on the banks of gravel in the sides of the rivers and exposed to their view; still they had not any at that time by them. I offered large rewards for any that should be found hereafter, and which were to be taken to Mr. Williams at Poverty Bay. Here, as at Waiapu, no one person could be found who possessed the hardihood positively to assert that he had seen the *Moa*, although this neighbourhood had ever been the dwelling-place of that tribe. The mountain, too, it appeared was by no means unknown to them; for, during a war between themselves and the Urewera tribe a few years ago, they had fled for refuge to their stronghold on the top of Wakapunake, where they had lived for some time, and where many of their relatives eventually fell into the hands of the enemy, who starved them into a surrender and took the place. Here then was still further proof (if proof was wanting), that no such colossal animal could possibly at this time be *existing* in this place. The spot, however, was well-chosen for the fiction of such a creature's residence: a huge, table-topped and lofty mountain, covered with primæval forests of gloomy pines; its brow singularly adorned with a horizontal stratum of whitish sandstone, which ran continuously and precipitously for more than two miles. At the base of the mountain ran the river Wangaroa, down which we paddled in canoes for some distance. This river is a branch of the Wairoa river, which disembogues into Hawkes' Bay.

These natives further informed me that a *Moa* resided at a certain high mountain in Te 'Waïti district, nearly five days' journey into the interior, in a N.W. direction from the place where we now were, and that *there* I should find people who had actually seen the animal. If I was little inclined to believe in the story of its existence before, I was much less inclined to do so now; however, as my route lay that way, I determined to make every possible inquiry after it.

Fifteen days after this I arrived at Te 'Waïti, the principal village of that district and not far from the residence of the second *Moa*. Here however, as before, the people had never seen a *Moa*, although they had always heard of, and invariably believed in, the existence of such a creature at that place. They,

too, had not any bones in their possession; though such, they said, were very commonly seen after heavy floods. The following day I passed close by the mountain where this *Moa* had resided for so many years, but noticed nothing more than usual (although I availed myself to the utmost of the use of my pocket telescope), save that this part of the country had a much more barren and desolate appearance than any I had hitherto witnessed.

I returned in the autumn to the Bay of Islands, without gleaning any further information relative to the *Moa*.

It should however appear (from information which I have recently received from the Rev. W. Williams), that very shortly after my leaving Poverty Bay, a *Moa* bone was brought him by a native which he immediately purchased. The natives in the neighbourhood hearing of a price being given for such an article as a bone, which they had ever considered as of little worth, were stimulated to exertion, and a great number, perhaps more than a hundred persons, were soon engaged in the field, actively searching after *Moa* bones; the result was, that Mr. Williams soon had the pleasure of receiving a large quantity of fossil bones, some of which were of an enormous size, and in a good state of preservation. The bones, though numerous, were not in any great variety, chiefly comprising such as I have already mentioned, i. e. those of the *femur* and *tibia*, together with those of the *tarsus*, the lower part of the *dorsal vertebræ*, and a portion of the *pelvis*. Altogether, the bones of nearly thirty birds, apparently of one species only, must have been brought to Mr. Williams. From the great difference in the sizes of some of them when compared with each other, Mr. Williams came to the conclusion, that the animal to which they once belonged must have been very long-lived. Whilst, however, I do not perceive how far this inference is to be correctly deduced from the mere difference in the size of the bones, we know that longevity is common to very many of the feathered race, particularly to those of the larger kinds. One of the bones, a *tibia**, measured 2 feet 10 inches in length, and was proportionably thick. Two others measured, each, 2 feet 6 inches in length. Another, a section of a *femur*, measured 8 inches in circumference in the smallest part! On putting together the bones of the leg and thigh (although none of them exactly fitted), and making the necessary allowance for the portions deficient of the processes of the joints, the intermediate cartilages, and lower tendons and integuments of the foot, we obtain at least six feet of the lower extremities of a bird; which, supposing its upper parts to accord in size with the lower ones, must have measured in altitude when

* This has been sent by Mr. Williams with several others to Prof. Buckland.

alive, at the lowest rate of calculation, from 14 to 16 feet!! An enormous feathered monster, well worthy, from its gigantic size, of being classed with the *Megalosaurus* of Buckland and the *Mastodon* of Cuvier.

It so happened that about this time a mechanic, who had been living at Cloudy Bay in the Middle Island, came to reside at Poverty Bay. He stated that this bird now existed in the high hills near Cloudy Bay; and that two Americans, residents at that place, hearing from a native that such a bird lived on the mountainous and snowy heights, provided themselves with arms, and thus equipped, went in high expectation of shooting one, taking the native with them as their guide. They ascended the mountain to the place where these birds resort, and, at the native's request, hid themselves behind some bushes. Presently they saw the monster majestically stalking down in search of food; they were, however, so petrified with horror at the sight as to be utterly unable to fire on him. They observed him for near an hour, ere he retired, and were glad enough at last to make their escape. They described this animal as being about 14 or 16 feet in height.

The bones from which the annexed drawings* were made, were all found at Turanga (Poverty Bay). They comprise a *tibia*, a *femur*, a *tarsus*, and fragments of a *pelvis* and *dorsal vertebra* of a *Moa*. They are very stout, are deeply marked with muscular impressions, and are in a good state of preservation. 1. The *tibia*, which is nearly perfect, measures 30 inches in length, and in girth, at the largest end, (where it was much broken away at the edges of the processes, and consequently reduced in size,) $16\frac{1}{2}$ inches; at the smallest end $12\frac{1}{2}$ inches, and in the smallest part, near the middle of the bone, $5\frac{1}{4}$ inches. There are not any remains of a fibula, however rudimentary, attached to the tibia, nor is there any apparent mark of attachment to indicate that such formerly adhered thereto. The largest tibia yet found in nearly a perfect state, measured 4 inches more in length than this†. 2. The *femur*, which also is nearly perfect, measures in length 13 inches; in girth, at the one end over the head of the femur, $11\frac{1}{4}$ inches, at the thickest end $12\frac{1}{2}$ inches, and in the smallest part $5\frac{1}{2}$ inches: the reticulated muscular impressions on this bone are very numerous and well-defined. I have seen a portion of a femur, the small part of which measured

* Drawings of these bones were sent to the Tasmanian Society, together with the original monographs.

† I much regret that I had not an opportunity of inspecting the largest and most perfect bones ere they were sent to England. A vessel sailing from Turanga for Port Nicholson, by which opportunity they were sent, was the reason of my not seeing them.

in girth 8 inches! 3. The *tarsus* (a small one), nearly perfect, measures in length 10 inches, and in girth at one end 9 inches, and at the opposite end 8 inches, and in the smallest part 4 inches: this bone is comparatively very short and flat, and has articulations for only three toes. 4. The portion of the *bone of the back and pelvis* is not so perfect, being a much-broken fragment, comprising from the upper outer edge of the *acetabulum* of the *os innominatum* to the lower joint of the *dorsal vertebræ*, in which the canal for the *medulla spinalis* is perfect. This bone, or rather fragment, measures, from the outer edge of the reticulation of the head of the *os femoris* to the outer broken edge of the bone (which is that portion approaching towards the upper part of the bone of the *pelvis*), 11 inches; and across the inner and smallest part of the bone, immediately beneath the last of the *dorsal vertebræ*, where it was most perfect, 7 inches: a correct idea cannot however be given of such a fragment as this, through the medium of a written description. This bone evidently differs very considerably from such bones in other birds, in its peculiar carinated shape in that portion of it which must have formed the highest part of the lumbar region; it must have been also considerably larger when entire, as the whole of the upper ridge is much broken. This bone is also very deeply indented with muscular impressions.

Having thus given, it is to be feared, rather a tedious detail of the *Moa*, and of the bones hitherto found, little more remains, at present, for the writer, than deferentially to offer a few remarks on the bones in question; and these suggestions which he has to submit may be noticed under two general heads. First, does the *Moa* now exist? or, at what period of time is it probable that it existed? Secondly, to what order or family can we reasonably suppose the *Moa* to belong?

It is very true that at this time we have but little to assist us in our search; nevertheless, let us commence and prosecute our inquiry, judiciously considering such aids as may present themselves to our notice in the course of our investigation at all bearing on the subject before us.

Our first inquiry then will be, does the *Moa* now exist? or, at what period of time is it probable that it did exist? To the first of these queries I reply, that it is my opinion that the species of bird whose bones we have now before us does no longer exist, at least in New Zealand: a few reasons for this opinion of mine I will here adduce.

From my knowledge of the New Zealander, I can but believe that there is no part of his native land which has not been trod by him, at one time or other, however mountainous or dreary it may be. As a proof of this, I might mention their having pro-

per names for every portion of land and water, whether hill or dale, lake or running stream; and their never being at a loss in describing distant or unfrequented parts of their own country, some one or other present among the "listening crowd" having either visited the places spoken of, or received a narration from some one who had. Now, as no New Zealander is to be found who can positively state that he has actually seen such a bird, and as every nook and corner of the land is well known to the natives, I conclude that the animal in question no longer exists in New Zealand. In recording this opinion, it will be seen that I pay no attention whatever to the strange and fearful account given of the *Moa* by some natives, a relation which carries with it its own proof of being false; as I know full well the *powers* of the New Zealander for romance, of which description of stories they have not a few among them. The account, too, furnished the Rev. W. Williams from the two American settlers, I also, in like manner, reject; but only as far as the bird whose bones we have before us is concerned. A very large and peculiar bird *may* exist in the mountainous district of the Middle Island; in fact, we know that several large birds well known to the natives, though hitherto unknown to science, live on the high hills in the Northern Island. But I cannot persuade myself to receive one man's relation as perfectly correct in every particular, against the united testimony of those persons from among the different tribes of the Northern Island with whom I have conversed on the subject; that person, too, an unscientific man, receiving his relation from others, who, by their own account, were not only powerfully operated on by fear, but who are also from that country in the "far west" whose natives are proverbially famed for their "long yarns."

In thus, however, disposing of that part of the question relative to the *present* existence of the *Moa*, we have still to inquire, at what period of time is it probable that this bird existed? And here, I think, we have to consider, first, the situation in which the bones are found; and secondly, any additional evidence which native tradition may be able to afford us.

The *Moa* bones, as far as I have been able to ascertain, have hitherto been only found within the waters and channels of those rivers which disembogue into the southern ocean, between the East Cape and the S. head of Hawkes' Bay, on the E. coast of the Northern Island of New Zealand. And, as I have before observed, they are only, when wanted, sought for after floods occasioned by heavy rains, when, on the subsiding of the waters, they are found deposited on the banks of gravel, &c. in the shallowest parts of the rivers. These rivers are, in several places, at a considerable depth below the present surface of the soil,

often possessing a great inclination, at once perceived by the rapidity of their waters. They all have more or less of a delta near their mouths, from a slight inspection of which it is known that their channels have, in those places at least, considerably changed. The rocks and strata in these localities indicate generally both secondary and tertiary formations; consisting, the former of argillaceous schist, sandstone, conglomerate, greensand, &c.; the latter of clay, marl, calcareous tufa, sand, gravel, and alluvial deposits. The real depositum, however, of the *Moa* bones is not certainly known.

From native tradition we gain nothing to aid us in our inquiries after the probable age in which this animal lived; for although the New Zealander abounds in traditionary lore, both natural and supernatural, he appears to be totally ignorant of anything concerning the *Moa*, save the fabulous stories already referred to. If such an animal ever existed within the times of the present race of New Zealanders, surely, to a people possessing no quadruped*, and but very scantily supplied with both animal and vegetable food, the chase and capture of such a creature would not only be a grand achievement, but one also, from its importance, not likely ever to be forgotten; seeing too that many things of comparative minor importance are by them handed down from father to son in continued succession, from the very night of history. Even fishes, birds and plants, (anciently sought after with avidity as articles of food, and now if not altogether, very nearly extinct,) although never having been seen by either the passing or the rising generation of aborigines, are, notwithstanding, both in habit and uses, well known to them from the descriptive accounts repeatedly rehearsed in their hearing by the old men of the villages. This very silence, however, I embrace as a valuable auxiliary evidence, bearing me out not a little in my conjecture, that the bones of the *Moa* will probably be found lying either in the upper stratum of the secondary or the lower strata of the tertiary formation. In fact, unless we suppose this immense bird to have existed at a period prior to the peopling of these islands by their present aboriginal inhabitants, how are we to account for its becoming extinct, and, like the *Dodo*, blotted out of the list of the feathered race? From the bones of about thirty birds found at Turanga in a very short time and with very little labour, we can but infer that it once lived in some considerable numbers; and, from the size of those bones, we conclude the animal to have been powerful as well as numerous. What enemies then had it to contend with in these islands, where, from its colossal size, it must have been para-

* See Note D., Appendix.

mount lord of the creation, that it should have ceased to be? Man, the *only* antagonist at all able to cope with it, we have already shown as being entirely ignorant of its habits, use, and manner of capture, as well as utterly unable to assign any reason why it should have thus perished.

The period of time then in which I venture to conceive it most probable the *Moa* existed, was certainly either antecedent or coetaneous to the peopling of these islands by the present race of New Zealanders.

But we will proceed, and endeavour to ascertain (as we proposed in the second place to do) to what order or family is it likely that the *Moa* belongs? In making this inquiry, we have little to assist us but the bones before us; from an attentive consideration of which we are necessarily led to conclude that the animal must have been of large size and great strength; and, from the shortness of the *tarsus* (when compared with the length of the *tibia*), we also perceive it to have been short-legged. From its size, we shall naturally be led to seek for its affinities among either the *Raptorial* or *Rasorial* orders; but from its *tarsi* possessing only articulations for three toes, we are at once precluded from supposing that it belonged to the former order; to which we may also add, *first*, the (so to speak) evidence of negation, of not a single specimen or fragment of a wing-bone having yet been found; and, *secondly*, the judicious observation of Cuvier (in reference to the family of *Struthionidæ*), that it would be morally impossible to fit such heavy bodies with wings sufficient to enable them to fly*. In the latter, however (the Gallinaceous or Rasorial order), we have the largest and stoutest birds known; these too are terrestrial in their habits, some exclusively so, and very often possess only three toes. It is true, that in general the different known members of the family containing the largest birds have their *tarsi* long, (whereas those of the *Moa*, as we have already seen, are short,) yet to this we have exceptions in the *Dodo* (alas! no more) and the *Apteryx*. And I think it is highly worthy of notice, that the latter, the only known existing genus of the family possessing short *tarsi*, is entirely confined to these islands.

From a conviction, then, that it is in this order only that the affinities of the *Moa* are to be sought with any prospect of suc-

* The Baron's words are, "It appears as if all the muscular power which is at the command of nature would be insufficient to move such immense wings as would be required to support their massive bodies in the air."—'Règne Animal,' Class Aves, ord. 5. fam. 1.—If such were the spontaneous remarks made by that illustrious naturalist on contemplating the size of the known members of that family, what would he not have said, had he but lived to examine the colossal structure of the *Moa*!

cess, and that it is in the family *Struthionidæ* where they will, doubtless, eventually be found, we are induced, for the present at least, to place the *Moa* in that gigantic group. In the absence, however, of a specimen of an *Apteryx** with which to compare the few bones we at present possess of the *Moa*, I should, I confess, be hazarding an opinion in saying that it was most nearly allied to that peculiar genus; yet when we consider, that out of the *five* existing genera of this family, three at least, apparently possessing the nearest affinities to the remains of the bird before us, belong exclusively to the southernmost parts of the southern hemisphere†, and that a connecting link is, as it were, wanting between the *Rhea* of the Straits of Magellan, the *Dromiceus* of New Holland, the *Casuarius* of the Indian Archipelago, and the *Apteryx* of New Zealand, and that this connecting link *may*, in all probability, be supplied in the *Moa*; I think we shall be constrained to assign our *Moa* a place between the genera *Casuarius* and *Apteryx*, possessing as it does (only in a much greater degree) the immense size and strength of the former, combined with the short tarsi, and probably wingless structure of the latter.

I venture however to suppose, that we may gain an additional gleam of light, both upon the probable period at which the *Moa* existed, and also on the family to which it may be allied, by a consideration of the etymology of its name. The word *Moa*, whence is it derived? I confess, I know not any New Zealand word from which it may be supposed to have derived its origin. And this will seem the more remarkable when we consider, that a very great number of New Zealand appellatives are not only derived and easily traceable, but are also generally highly expressive of some action or quality of the thing itself; chiefly too is this to be observed when such action or quality is peculiar or uncommon. But in the *Moa*, the most uncommon animal New Zealand has ever produced (especially in the estimation of a native), we have a cognomen which seems an entire exception to the common rule; for, as far I understand it at present, it has, in reference to this immense animal, no meaning whatever. Further, it may not be amiss also to notice *en passant*, that it is of rare occurrence in the language to find anything bearing so very *short* an appellative as the bird in question. In the Friendly, Society, and Sandwich groups, the term "*Moa*" has been, I believe, invariably given by the natives of those islands to the domestic cock, and used as the proper

* It has been my good fortune to have at different times several specimens of the *Apteryx* in my possession; at present, however, I have not one, nor do I know in whose possession one is to be found in New Zealand.

† See Note E., Appendix.

name for that animal by the missionaries there. The New Zealander, in relating his fabulous account of the *Moa*, almost invariably said, it was like a "*tikaokao*," i. e. a cock, (they having given the cock that name from its crow, which to them sounded like those letters when drawn out and pronounced after their manner,) and that it was adorned with wattles, &c. Without at all, at present, entering into the question as to what country or countries the existing race of New Zealanders emigrated from to these islands, the popular belief, that at least a portion of them is of Malay origin, is, I think, in connexion with the name of this bird, worthy of notice; for whilst we know the term "*Moa*" is used to denote the cock in the Friendly Islands and other groups, it is only in the isles of the Indian Archipelago that the cassowary (*Casuarius Casoar*, Briss.) is to be found, and this bird too is "heavy and stoutly built," and the only one of the whole family of *Struthionidæ* possessing wattles; for, according to Cuvier, it "has the skin of its head and top of the neck naked, of an azure-blue and fiery-red colour, with pendent caruncles like those of the turkey, and is the largest of all birds next to the ostrich*." May we not, I would ask, be allowed to conjecture, that in that now long-past period, when the forefathers of the present race of aborigines first landed on these shores, a few of those New Zealand birds might still be found in the most secluded and mountainous retreats, having hitherto escaped the repeated inroads of the original inhabitants (or, we may suppose that the bones only were seen and identified to belong to a bird by those new-comers), to which, from their real or supposed resemblance to those of the cassowary, they gave the name of *Moa*; the name which that giant bird bore in their fathers' land?

This conjecture, however, may be much more fully established, on ascertaining the name by which the cassowary is known to the present inhabitants of the islands of the Indian Sea.

The ornithology of New Zealand, now that these islands are become a British colony, will soon be known; and we may rest assured, that *if* such an animal exists, it cannot much longer remain concealed. And, it is further to be hoped, that ere long we shall be enabled to find somewhat more of the fossil remains of the *Moa*, so as not merely to form in part conjectural opinions on its size, habits and affinities, but so as to be well assured of what this prodigious creature really was.

WILLIAM COLENSO.

Paihia, Bay Islands, New Zealand, May 1, 1842.

* Vide Cuvier, 'Règne Animal,' class Aves, gen. *Casuarius*.

APPENDIX.

Note A., page 81.

The *Tuatara* is an animal belonging to the class *Reptilia*, order *Sauria*; but to which of the families composing the same, I cannot, in the absence of books of reference, at present determine. It appears to possess characters common to *Lacertinidæ* and *Iguanidæ*, in its having the thin and extensible tongue of the former, combined with the undivided one of the latter. It is common in some parts of New Zealand, particularly on rocky headlands and islets lying off the coast. I have one at present in spirits, which I had alive for nearly three of the winter months; during which time, although I repeatedly tried to get it to take some kind of food, I could not succeed. From its habits I supposed it to be a hybernating animal. It measured 19 inches in length, had a row of elevated spines (or rather recurved scales) nearly the whole length of its back, and appeared a perfectly harmless creature. It was taken, with two others, on Karewa islet, off Tauranga harbour, in the Bay of Plenty. The natives speak of another species possessing a forked tail! and assert that a larger species, which inhabits swampy places, has been seen six feet in length, and as thick as a man's thigh. The largest, however, that I have ever heard of did not measure above two feet in length.

Note B., page 82.

The shells of several species of *Haliotis*, *Ostrea*, and other nacrescent genera, are commonly used by the natives inhabiting the isles of the South Pacific for this purpose. A narrow slip of the shell is firmly fastened to the back of the hook, the barb of which is generally concealed by a tuft of metallic-surfaced blue feathers, procured either from the Korora (*Aptenodytes minor*) or the Kotaretare (*Dacelo Leachii*). The hook thus prepared and attached to a stout line, composed of the fibres of the Korari (*Phormium tenax*), which, after being cleaned from the parenchymatous parts, are twisted together with the hand, is drawn quickly through the water by a person paddling a small canoe; the larger fish, believing this glittering lure to be their prey, eagerly pursue it, and greedily catching at the same are taken. In favourable weather a great number of fine fish are soon captured by this method. Among the New Zealanders it is a very favourite sport, and one that is not a little animating, when several canoes are engaged. I have seen upwards of twenty small canoes thus employed on a fine summer's evening, on the beautiful sheet of water in the Bay of Islands. I may here mention, that previous to the introduction of the Gospel among the New Zealanders, their hooks were often composed of human bone; those of their enemies being used for that purpose. Sometimes they formed their hooks from the tough stalks and branches of Tauhinu (*Pomaderris ericifolia*) and Mangemange (*Lygodium volubile*), hardening them by the aid of fire. At present they invariably prefer the hooks which they make from iron nails to those of our manufacture, the latter, they allege, being much too brittle.

Note C., page 82.

Whoever has read the marvellous 'Thousand-and-one Nights' must be well acquainted with the monstrous stories related of this extraordinary bird; its celebrity, however, is not confined to that work. "*Rukh*," says the author of the Arabic Dictionary, "is the name of a monstrous bird which is said to have powers sufficient to carry off a live rhinoceros." To this animal Marco Polo also refers, in his relation of the story of the ambassadors:—"The *rukh* is said, by persons who have seen it, to measure sixteen paces across the wings from tip to tip, the feathers of which are eight paces in length, and thick in proportion. A feather of the rukh was brought by those messengers who were sent by the Grand Khan for the purpose of making inquiries respecting it, which feather is positively affirmed to have measured ninety spans, and the quill part to have been two palms in circumference." The existence of this immense bird seems to have obtained universal credence throughout all the eastern nations; and while ancient historians make mention of certain enormous and peculiar animals as common to the Orientals, scientific men of modern times have wisely omitted such relations from their nomenclature.

Note D., page 89.

The only quadrupeds indigenous to New Zealand are a dog, a small rat, a few Saurians, a bat, and on the coast, one or two species of seal. The dog (*Kuri**) is a small animal (somewhat resembling the variety known as the *pricked-ear shepherd's cur*) with erect ears and flowing tail; its cry is a peculiar kind of whining howl, which, when in a state of domestication, it utters in concert at a signal given by its master, and is most unpleasant. Of the skins of these animals the New Zealanders make a durable garment, which when composed of alternate strips of black and white fur has a handsome appearance. Its flesh was formerly eaten. This variety of dog has however become very scarce in consequence of the continued introduction of other and larger varieties.

The rat (*Kiore*) is a small field species of *Arvicola*, Cuv., now seldom met with. Its place unfortunately is more than supplied with the common species of *Mus* (*M. musculus*, *M. rattus*, and *M. decumanus*†), which everywhere abound, to the infinite annoyance of

* The natives have several names for the dog in addition to that of *kuri*, such as *moimoi*, *kirehe*, *peropero*, and the general appellative of *kararehe*. M. Balbi, 'Introd. à l'Atlas,' p. lxix, mentions *pero*, the New Zealand term for dog, as being derived from the Spanish *perro*, and as affording a proof that the animal was originally of foreign introduction, and obtained in comparatively recent times; the natives however invariably assert their always having had this animal among them.

† These species are severally distinguished by the natives: the indigenous animal is termed *kiore maori* (i. e. native rat); *M. musculus*, *kiore iti* (i. e. little rat); *M. rattus*, *kiore mangu* (i. e. black rat), or *kiore pakeha* (i. e. foreign rat); and *M. decumanus*, *maunga rua* (i. e. barn abider.)

the natives. The indigenous species was used as an article of food by the New Zealanders, being when fat in high repute as a delicious *morceau*.

Of the order *Sauria*, at least six distinct species are now in my possession. They are all (with the exception of the *Tuatara* already mentioned) small animals. Two beautiful species, one a light green with a long tail, the other a darker green, with white oblong and subreniform spots, are called by the natives *Kakariki* and *Kakawariki*. These are often found basking in the sun stretched on the upper branches of some shrub. Two other species of an ash colour, elegantly marked with gray and brown waterings, called by the natives *Pàpà*, are found in rotten and hollow trees. These four species are broad and flat, and have small scales which are not imbricated. Two other graceful species, with bodies much narrower and more elongated, of a brown colour with numerous light and dark coloured markings and dots, are called by the natives *Mokomoko*. One of these last-mentioned species is very common, and may be obtained in abundance in the summer season on the shores among the dry algæ and other light substances a few feet above high-water mark. The other of these last-mentioned species is very scarce, I having only casually seen it in decayed trees in forests. All the species are harmless, and are objects of superstitious dread to the New Zealander; chiefly so however to the old and ignorant. The flesh of the *Tuatara* alone is made use of by the natives as an article of food; only however by one or two tribes inhabiting the interior of the island, for which they have been often spoken contemptuously of by their countrymen.

The bat I have never had an opportunity of closely examining. It is however a small species, and like its European relative, is commonly seen flitting its tortuous maze on a fine summer's evening. The natives call it *Pekapeka*.

The seals (*Phocæ*) I have never seen; they are, nevertheless, well-known to the natives, who call them *Kekeno*, and assert that they come on shore at night to browse on thistles! When captured, as they sometimes are, they afford the New Zealander a rich repast. They in all probability comprise the species *Ph. leptonyx*, Blainv., and *Ph. leonina*, Linn.

Pigs, dogs, cats, rats and mice are now both wild and numerous throughout the whole island. Even the dense forests of the interior, far away from the residence of men, are infested with the smaller vermin. The natives attribute the destruction and all but extinction of the Kiwi (*Apteryx australis*), the Koitareke (a species of *Tetrao*), the *'Weka* (a large and unknown bird with short wings, probably allied to the genus *Ardea*), the *Kiore maori*, and other terrestrial animals, to the voracity and numbers of those foreign pests.

Note E., page 91.

It may not be amiss to give here an outline of the genera composing the family of *Struthionidæ*, seeing they are but few. Each

genus contains but a single species. In the present state of our knowledge the group may be thus arranged :—

Class AVES.

Order IV. Rasores, Vigors.

Family IV. Struthionidæ.

1. Genus *Struthio*, Linnæus. (Type of the group), *Ostrich* of South Africa : possessing two toes.
2. Genus *Casuarius*, Brisson. *Cassowary* of the Indian Archipelago : three toes.
3. Genus *Dromiceius*, Vieillot. *Emeu* of N. S. Wales : three toes.
4. —— *Rhea*, Vieill. *Nandu* of Straits of Magellan : three toes.
5. —— *Didus*, Linn. *Dodo*, formerly an inhabitant of the Isles of Mauritius and Bourbon : three toes : extinct!
6. Genus *Apteryx*, Shaw. *Kiwi* of New Zealand : three toes and a rudimentary one.
7. —— ——? ——?* *Moa* of New Zealand : three toes : supposed to be extinct.

XIII.—*On some British species of* Œnanthe. By Charles C. Babington, M.A., F.L.S., F.G.S. &c.†

My friend Mr. Ball having most kindly allowed me to read his paper upon *Œnanthe* (p. 4 of the present volume) before its publication, I have availed myself of his permission, and prepared the present memoir upon the same subject, which, it will be seen, is one which presents very considerable difficulty.

To my valued friend the Rev. W. L. P. Garnons I am indebted for specimens of *Œnanthe* from "a marsh between Weymouth and Portland Island" which agree very well with Mr. Ball's description of *Œ. pimpinelloides*, but want the radical leaves. All the stem leaves that remain (the lowest alone being wanting) have linear simple pinnules. The diachenia are unripe, as is also unfortunately the case in all my foreign specimens of *Œ. pimpinelloides*; but still they show a considerable difference of form from those of *Œ. Lachenalii*, narrowing in a slight degree from the summit downwards, and being furnished at the base (as far as I can judge from unripe dried specimens) with the fleshy prominent ring found in the true *Œ. pimpinelloides*; they are crowned with the erect persistent limb of the calyx, and about equal the length of the rigid, slightly divergent styles. The leaflets of the involucels differ slightly in form and proportions, being linear-subulate or

* Prof. Owen's observations on this subject are given at p. 444, vol. xii., and p. 59, vol. xiv. of this Journal; the generic name of *Dinornis* has been assigned by Prof. Owen to this monster bird, and no less than five species distinguished.—Ed.

† Read before the Botanical Society of Edinburgh, 9th May, 1844.